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In re application of:

Uri MAHLAB

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METHOD AND APPARATUS FOR ROUTING DATA-CARRYING OPTICAL SIGNALS

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APPEAL BRIEF

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REAL PARTY IN INTEREST

The real party in interest is ECI Telecom Ltd.

RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any prior and pending appeals, judicial proceedings or interferences which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

STATUS OF CLAIMS

Claims 1-44, 56, 58, 60-65, 74-81, and 85 were cancelled before final rejection. Claims 45-55, 57, 59, 66-73, 82-84, and 86 are rejected. Claims 57, 59, and 84 were cancelled with an amendment filed concurrently with this brief. All of the claims stand and fall together.

STATUS OF AMENDMENTS

An amendment under 37 C.F.R. § 41.33 is being filed concurrently with this Appeal Brief. This amendment merely cancels claims 57, 59, and 84. No other amendment was filed after the final rejection of October 27, 2010.

SUMMARY OF CLAIMED SUBJECT MATTER

Claims 45, 46, 66, 82, and 86, are independent claims. Claims 48-52 depend from claim 45; claims 47 and 53-55 depend from claim 46; claims 67-73 depend from claim 66; and claim 83 depends from claim 82.

The following is an annotated version of the appealed claims, showing for each element in brackets and bold text, citation to the specification by reference number, figure, and page and line number.

45. In a telecommunication system **{200}**, a method for routing optical data signals **{page 4, line 1 (hereinafter "PN:LN-LN"}** using

a first communication path **{Fig. 2; optical data bus 202; 11:26-11:28}** comprising at least one optical fiber **{Fig. 2, optical data bus 202, 11:26-11:28; Fig. 3, data fiber 301}** extending between at least two network elements **{routers; 4:7-11; 11:7-9}** of the telecommunication system for carrying optical data signals separated from their associated optical addressing signals **{Fig. 5, 15:7-8 4:16-19 and 15:29 – 16:3}**, and

a second communication path **{Fig. 2; optical address bus 203; 11:28-12:1}** comprising one or more optical fibers **{Fig. 2, bus 203, 11:28-12:1; Fig. 3, bundle 304, 13:14-15}** extending between at least two network elements **{Fig. 2, bus 203, 11:28-12:1, routers; 4:7-11; 11:7-9}** of the telecommunication system for carrying optical addressing signals separated from their associated optical data signals **{Fig. 2, 11:28-13:5; Fig. 3, 14:12-15 ; 4:16-19 and 15:29 – 16:3}**, each of said at least two network elements having routing capabilities, the method comprising the steps of

providing a combination of said optical addressing signals to provide addressing information required for establishing an address for routing the optical data signals **{4:12-14; Fig. 2, 12:1-22; Fig. 4, 11:28-13:5; Fig. 3, 14:6-22, 14:24-15:2}**, and

providing at least one of said at least one optical fiber comprised in said first communication path **{Fig. 2, optical data bus 202, 11:26-11:28; Fig. 3, data fiber 301, 14:14-15}** for carrying said optical data signals separated from their associated optical addressing signals[,][1] different from any of the one or more optical fibers comprised in said second communication path **{Fig. 5, 15:7-8, 15:29 – 16:3}**, and

wherein said optical data signals being conveyed separately from their associated optical addressing signals along said at least one optical fiber **{Fig. 5, 15:7-8 4:16-19; 15:29 – 16:3}** were generated at a plurality of different network elements **{11:26-28; 12:24-13:24}**, each of said plurality of different network elements having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**.

46. In a telecommunication system **{200}**, a method for routing optical data signals **{4:1}** between at least two routers in the system **{4:21-25; 12:16-20}**, said method comprising:

generating first optical addressing signals associated with the optical data signals by converting signals identifying a destination address into corresponding optical addressing signals **{4:12-14; Fig. 2, 12:1-22; Fig. 4, 11:28-13:5; Fig. 3, 14:6-22, 14:24-15:2};**

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[1] The comma is not present in the claims on appeal. If the rejection is reversed, Appellant intends to file an amendment to add the comma to improve readability of the claim.

transmitting said optical addressing signals separated from their associated optical data signals over one or more optical fibers comprised in a first communication path **{Fig. 2; optical address bus 203; 11:28-12:1}** said first communication path extending from one of the at least two routers to another router **{12:12-22}**, each of said at least two routers having routing capabilities**{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**; and

concurrently or subsequently transmitting said optical data signals separated from their associated optical addressing signals to said another router **{4:16-19 4:21-25 15:29 – 16:3}** via a second communication path **{Fig. 2; optical data bus 202; 11:26-11:28}** comprising at least one optical fiber **{ Fig. 2; optical data bus 202; 11:26-11:28; Fig. 3, data fiber 301}**, said second communication path extending from said one router of the at least two routers to the another router **{Fig. 2, bus 203, 11:28-12:1, routers; 4:7-11; 11:7-9}**, and comprising at least one optical fiber which is different from any of the at least one optical fibers comprised in said first communication path **{Fig. 2; optical address bus 203; 11:28-12:1}**, wherein said optical data signals being conveyed separately from their associated optical addressing signals **{Fig. 5, 15:7-8 4:16-19; 15:29 – 16:3}** were generated at a plurality of different network elements **{11:26-28, 12:24-13:24}**, each of said at least two network elements having routing capabilities**{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**.

47. The method according to claim 46, further comprising the steps of:

generating new optical addressing signals associated with the next section of a transmission path extending from said one router of the at least two routers towards said destination address **{12:24-13:5; Fig. 5, 15:15-19}**;

transmitting the new optical addressing signals over one or more optical fibers extending between said one router of the at least two routers and another router **{Fig. 2, 12:24-13:5; 4:21-25; 12:16-20}**;

transmitting said optical data signals to said another router via an optical fiber extending between said one router of the at least two routers and said another router **{12:16-20}** wherein said optical fiber over which said optical data signals are transmitted is different from said one or more optical fibers for carrying said optical data signals separated from their associated optical addressing signals **{Fig. 5, 15:7-8; 4:16-19; 15:29 – 16:3}**; and

repeating the steps of generating new optical addressing signals **{4:19-29}**, transmitting the new optical addressing signals separated from their associated optical data signals and transmitting said optical data signals separated from their associated new optical addressing signals to said another router, until said optical data signals are transmitted to said destination address via subsequent routers located along a transmission path extending towards said destination address **{13:1-5}**.

48. The method according to claim 45, further comprising the step of transmitting, at one of two binary illumination states, the information extracted from at least one of the optical addressing signals **{5:1-2; Fig. 3, 14:6-15; original claim 6}**.

49. The method according to claim 45, further comprising the steps of transmitting, at a certain illumination level, at least one of the optical addressing signals and presenting, by absence of illumination at least one other optical addressing signal **{5:1-5; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 7}**.

50. The method according to claim 45, wherein at least two of the optical addressing signals are transmitted each at substantially the same wavelength and at a different illumination intensity **{5:7-9; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 8}** and wherein each of the illumination intensities corresponds to a different addressing information **{5:10-11; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 8}**.

51. The method according to claim 45, wherein at least two of the optical addressing signals are transmitted each at substantially the same intensity and at a different wavelength **{5:11-12; 13:26-14:4; original claim 9}**, and wherein each of the different wavelengths corresponds to a different addressing information **{5:13-14; 13:26-14:4; original claim 9}**.

52. The method according to claim 50, wherein an optical address is derived from a combination of at least two optical addressing signals each transmitted at a different wavelength and at a different intensity from the other **{5:16-18; 13:26-14:4; original claim 10}**.

53. The method according to claim 46, wherein the transmission of at least one of the optical data signals is delayed until the following steps are performed **{5:20-22; 15:21-16:3; original claim 11}**:

decoding said optical addressing signals **{5:23; 16:4; original claim 11}**;

deriving addressing information from the decoded optical addressing signals **{5:24-25; 16:4-5; original claim 11}**; and

if required, generating another, or using said, optical routing address for further routing of said optical data signals **{5:26-27; 16:5-10; original claim 11}**.

54. The method according to claim 53, wherein the transmission of said at least one of the optical data signals is delayed by allowing said at least one of the optical data signals to pass through an optic fiber of a length corresponding to a desired delay in the transmission **{6:1-3; 16:5-10; original claim 12}**.

55. The method according to claim 46, further comprising:

transmitting to said one of the at least two routers an indication that said optical data signals can be forwarded towards their destination **{13:11-18}**;

receiving said indication at said one of the at least two routers **{13:19-20}**; and

transmitting, responsive to receiving said indication, said optical data signals towards said another router along said data transmission path **{13:20-24}**.

66. Routing apparatus for routing optical data signals **{6:23-25; Fig. 5, 15:4-19; original claims 18, 19}**, said apparatus comprises:

means for generating first optical addressing signals associated with said optical data signals by converting signals identifying a destination address into corresponding optical addressing signals **{7:1-3; Fig. 5, bundle 304, electro-optical address detector 204, controller 205, optical switches 503, address generator 501; original claim 19 a)}**;

means for transmitting said optical addressing signals from said routing apparatus to a second router over a first communication path comprising at least one optical fiber for

carrying said optical addressing signals separated from their associated optical data signals **{7:5-6; Fig. 5, cable 207, address fibers bundle 304, data fiber 505; original claim 19 b)}**, each of said routing apparatus and said second router having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**; and

means for transmitting said optical data signals from said routing apparatus to said second router along a second communication path comprising at least one optical fiber, said at least one optical fiber for carrying said optical data signals separated from their associated optical addressing signals **{7:7-8; Fig. 2, optical data bus 202, 11:26-11:28; Fig. 3, data fiber 301, Fig. 5, 15:7-8; 4:16-19 and 15:29 – 16:3}** and wherein said at least one optical fiber for carrying said optical data signals separated from their associated optical addressing signals is different from any of the at least one optical fibers comprised in said first communication path **{optical data bus 202, 11:26-11:28; Fig. 3, data fiber 301, 14:14-15; Fig. 5, 15:7-8; 15:29 – 16:3}**, and wherein said optical data signals being conveyed separately from their associated optical addressing signals, were generated at a plurality of different network elements **{11:26-28, 12:24-13:24}**, each of said plurality of different network elements having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**.

67. The apparatus according to claim 66, in which at least one of the optical addressing signals is transmitted at a certain illumination level and at least another optical addressing signal is presented by absence of illumination **{5:1-5; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 22}**.

68. The apparatus according to claim 66, in which at least two of the optical addressing signals are transmitted at substantially similar wavelengths and at a different

illumination intensity **{5:7-9; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 23}**, and each of the illumination intensities corresponds to a different addressing information **{5:10-11; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 23}**.

69. The apparatus according to claim 66, wherein at least two of the optical addressing signals are transmitted at a different wavelength **{5:11-12; 13:26-14:4; original claim 24}**, and each of the different wavelengths corresponds to a different addressing information **{5:13-14; 13:26-14:4; original claim 24}**.

70. The apparatus according to Claim 69, wherein said at least two of the optical addressing signals are transmitted at substantially similar intensity **{13:26-14:4; original claim 25}**.

71. The apparatus according to claim 66, in which at least two of the optical addressing signals are transmitted each at a wavelength and intensity that are different from the wavelength and intensity of the other one of said at least two of the optical addressing signals **{5:7-11; 11:28-12:5; 13:26-14:4; 14:5-22; original claim 26}**.

72. The apparatus according to claim 66, further comprising:

means for delaying said optical data signals **{7:21-22; Fig. 5, data fiber 301; 15:21-16:3; original claim 27 a)}**;

means for decoding said optical addressing signals **{7:23; Fig. 4, photodiodes 401; Fig. 5, bundle 304, electro-optical address detector 204, 16:4; original claim 27 b)}**;

means for deriving addressing information from the decoded optical addressing signals **{7:24-25; 16:4-5; original claim 27 c)}**; and

means for generating optical routing address signals for further routing of said optical data signals **{7:26-27; controller 205, optical switches 503, address generator 501; 16:5-10; original claim 27 d)}**.

73. The apparatus according to claim 72, comprising an optic fiber for delaying the transmission of at least one of the optical data signals **{8:1-2; Fig. 5, data fiber 301; 15:21-16:3; original claim 28}** and means for directing said at least one of the optical data signals to pass through said optic fiber **{8:2-3; Fig. 5, controller 205, optical switches 503, optical cable 205; 15:10-14; original claim 28}**.

82. Apparatus for transmitting optical data signals between at least two network elements in a system **{9:5-18; Fig. 2, system 200, optical link 201, 11:22-25; Fig. 5, 15:4-19; original claims 18, 19, 31}**, comprising:

a) signal generating means for generating optical addressing signals associated with said optical data signals by converting signals identifying a destination address into corresponding optical addressing signals **{9:8-9; Fig. 5, bundle 304, electro-optical address detector 204, controller 205, optical switches 503, address generator 501; original claim 31 a)}**;

b) transmission means for transmitting said optical addressing signals separated from their associated optical data signals over a first communication path comprising one or more optical fibers and extending between the at least two network elements towards said destination address **{9:10-11; Fig. 5, cable 207, address fibers bundle 304, data fiber 505; original claim 31 b)}**, each of said at least two network elements having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**; and

c) transmission means for transmitting said optical data signals towards said destination address along a second communication path comprising at least one optical fiber extending between the at least two network elements for conveying said optical data signals separated from their associated optical addressing signals **{9:12-13; Fig. 2, optical data bus 202, 11:26-11:28; Fig. 3, data fiber 301, 14:14-15; original claim 31 c)}**, wherein at least one of said at least one optical fiber in said second communication path is different than any of the at least one optical fibers comprised in the second communication path **{optical data bus 202, 11:26-11:28; Fig. 3, data fiber 301, 14:14-15; Fig. 5, 15:7-8; 15:29 – 16:3}**, and wherein said optical data signals being conveyed separately from their associated optical addressing signals **{Fig. 5, 15:7-8 4:16-19; 15:29 – 16:3}**, were generated at a plurality of different network elements **{11:26-28; 12:24-13:24}**, each of said plurality of different network elements having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**.

83. The apparatus according to Claim 82, further comprising means for receiving an indication that said optical data signals can be forwarded towards their destination **{photo-sensitive element; 13:11-20, original claims 31 d), 32, 34}**, wherein said means for transmitting said optical data signals is adapted to transmit the optical data signals towards said destination responsive to receiving said indication **{13:18-24; original claims 31 e)-f), 33}**.

86. A telecommunication routing apparatus **{Fig. 5, 15:4-19; original claims 18, 19, 31, 40}** comprising:

a) receiving means for receiving first optical addressing signals **{Fig. 5, electro-optical address detector 204, 15:8-9; original claim 40 a)}**;

b) signal generation means for generating second optical addressing signals associated with the next section of a transmission path extending towards a destination address **{Fig. 3, light emitting sources 302, optic fiber 303, bundle 304, 14:6-22; Fig. 5, routing table, controller 205, optical switches 503, address generator 501; 15-10-19; original claim 40 b)}**;

c) transmission means for transmitting the second optical addressing signals separated from associated optical data signals over one or more optical fibers extending from said telecommunication routing apparatus towards the destination address representing a second network element **{routers; 4:7-11; 11:7-9; Fig. 2; optical address bus 203; 11:28-12:1; 15:18-19; bundle 304; original claim 40 c)}**, said telecommunication routing apparatus and said second network element each having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**;

d) receiving means for receiving optical data signals generated at a plurality of different network elements **{Fig. 5, 15:6-8; 15:12-15; router matrix 502, data fiber 301, cable 207, data fiber 505, original claim 40 d)}**, each of said plurality of different network elements having routing capabilities **{4:3-4; Fig. 2, routers; 4:7-11; 11:7-9}**; and

e) transmission means for transmitting the optical data signals received towards the destination address along an optical path extending from the telecommunication routing apparatus toward the second network element which comprises at least one optical fiber that is different from any one of said one or more optical fibers over which the second optical addressing signals separated from their associated optical data signals are transmitted **{Fig. 2, 12:24-13:5; Fig. 5, data fiber 301, cable 207, data fiber 505, 15:7-15; 4:16-19 and 15:29 – 16:3; original claim 40 e)}**.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 45-47, 53, 55, 57, 66, 72, 82-83, and 86 are unpatentable under 35 U.S.C. § 102(b) as being anticipated by Barnsley (U.S. Patent No. 5,488,501).

Whether claims 48-52, 54, 59, 67-71, 73, and 84 are unpatentable under 35 U.S.C. § 103 as being unpatentable over Barnsley and Nir (U.S. Patent No. 6,160,653).

ARGUMENT

I. CLAIMS 45-47, 53, 55, 57, 66, 72, 82-83, AND 86 ARE NOT ANTICIPATED UNDER 35 U.S.C. § 102(B) BY BARNSLEY (U.S. PATENT NO. 5,488,501)

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). Anticipation is established when every element and limitation of the claimed invention can be found in a single prior art reference, arranged as in the claim. *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001).

A. THE CITED PRIOR ART

1. BARNSLEY

Barnsley discloses a system for optical header recognition in packet switching networks. Col. 1, lines 6-8 ("hereinafter "1:6-8"). In Barnsley, an optical data generator 4 generates data packets, and a header generator generates header (control) signals. 3:55-64. Barnsley discloses that the "two signals 4a and 5a are superimposed onto the fibre 2 by means of a WDM coupler 6." 3:55-4:7. "The header generator 5 produces header (control) signals… by modulating a second laser … so that the laser of the header generator 5 is turned on at, or just before, the start of the data packet… the header generator 5 is tunable so as to provide control signals at different wavelengths, each of which matches the receive wavelength of another network node" (3:60–4:5). Mahlab, ¶ 34. The modulation of the second laser (not shown) is chosen "so that the laser of the header generator 5 is turned on at, or just before, the start of a data packet 4a, off at, or just after, the end of that data packet." 3:65-4:1.

The fibre 2 connects the head-end station to the node 1, where the fibre 2 is connected to splitter 7. Fig. 1. The node 1 includes an optical switch 8 for "adding data to, and dropping data from, the network." 4:8-9. As seen in Fig. 1, a first input 9a of the switch 8 is connected to the input fibre 2 via the splitter 7. 4:10-12. The first output port 11a of the switch is connected to the output fibre 3, and the second output port 11b is connected to a receiver 12 via a band-pass filter 13. 4:14-17. The signal reaching the receiver 12 is solely a data signal, because the filter 13 filters out noise, and the remaining control signal 5a. 4:34-38.

According to Barnsley, "the splitter 7 demultiplexes a small proportion (typically a few percent) of the control signal 5a of an incoming packet and feeds this tapped signal to a band-pass filter 14 via a 1.3 μm optical amplifier 15." 4:18-21. The control signal 5a overlaps the data signal 4a in the packet. 4:28-29. In this way, the switch 8 opens at, or just before, the start of the data reaches the switch and is closed at, or just after, the end of the data leaves the switch 8. 4:28-32. The rest of the incoming signal not split by the splitter 7 (*i.e.*, the data signal and the control signal) travels along the fiber 2 between the splitter 7 and the switch 8, to the first input port 9a. See, 4:38-44. Barnsley teaches use of "a delay unit 24 to provide an appropriate delay between the transmission start times of the control and data signals, thereby to ensure that the control signal 5a completely overlaps the data signal 4a at the destination node…." 4:10-14.

2. NIR

Nir discloses a method for routing optical data packets, and more specifically, an optical address decoder that can be used to implement TDM or ATM in an optical data communications network. 3:23-25. According to one of the disclosed embodiments, the addresses are encoded as either the presence or absence of an optical pulse. 6:23-25.

B. The Examiner Erred in Not Giving Any Weight to Appellant's Declaration

The Examiner has steadfastly maintained these rejections over many office actions. In response to the Office Action of January 28, 2009, Appellant filed the declaration of Dr. Uri Mahlab, the inventor in this case, and an expert with more than ordinary skill and experience (Exh. 1, Mahlab Declaration, Paragraphs 1-4, hereinafter "Mahlab, ¶¶1-4"), which evidences how one of ordinary skill in the art would interpret the claims, and the cited art. The Final Action did not address the declaration, or explain why the evidence presented therein was being given no weight. For if it had been given weight, the Examiner would have had to allow the claims, as the declaration clearly establishes that the Examiner's broad interpretation of the term "network elements" and "routers" is unreasonable, and not in accord with the understanding of one of ordinary skill in the art at the time the invention was made, i.e., by January 2000. Appellant respectfully submits that it was clear error to ignore the declaration evidence and for that reason alone, the Examiner's rejection should be reversed.

C. Barnsley Does Not Disclose the Claimed Network Elements or Routers

Each of the independent claims 44, 46, 66, 82, and 86, recite either network elements or routers, between which two communication paths are provided. Appellant contends that since Barnsley does not disclose communications between network elements or routers where the data signals are conveyed along one path and control signals along the other, as those terms are used in Appellant's invention as defined in the specification, and as they would be understood by one of ordinary skill in the art, Barnsley cannot and does not anticipate the claimed invention as recited in the independent claims.

Specifically, the Examiner has taken the position that the claimed first communication path is the optical path between optical data generator 4 and WDM coupler 6 in Figure 1 of Barnsley, and that the communication path between the output of splitter 7 (referred to by the Examiner as “coupler 7” in the Final Rejection, page 2, line 9 of paragraph 2) and the input of optical switch 8 in Figure 1 is the claimed second communication path. The Examiner further asserts that “elements 4, 5-8, and 14-15 are network elements are elements within the network and can therefore be broadly considered as network elements.” Final Rejection, page 13, ¶ 5.

The Examiner’s broad interpretation of the term network elements and routers is unreasonable in light of Appellant’s specification and the interpretation that one of ordinary skill in the art would give those terms as explained in the Mahlab Declaration.

In connection with Fig. 1, Barnsley relates only to two network elements as defined in Appellant’s specification, namely, node (1) and a head-end station (not shown in detail) provided with an optical data generator 4 and a header generator 5. The two signals 4a and 5a that are generated respectively by optical data generator 4 and header generator 5, are superimposed onto the fibre 2 by means of a WDM coupler 6. (3:55-4:7). Therefore, the equivalent of the network elements of the present invention to which Barnsley relates in Fig. 1 are only the head-end station and node 1, and the path extending therebetween is only one path along which only combined signals are conveyed.

Appellant respectfully submits that the points 4, 5, 6, 7, 8, 14 and 15 of Barnsley are not network elements as they would be understood by one of ordinary skill based on Appellant's disclosure. Mahlab, ¶ 14. As discussed in the summary of Appellant’s specification,

> the network element in accordance with the present invention is a device provided with routing capabilities, e.g. a router, and the like. For the sake of convenience such a network element will be referred to hereinafter as a 'router', but this term should be understood to encompass also any other device having switching and forwarding capabilities.

Mahlab, ¶ 15. Each of the independent claims recites that the network elements, routing apparatus, and/or routers each have routing capabilities. One of ordinary skill in the art would understand, based on the knowledge of the relevant technology, and from reading the specification, that a router, or a network element having routing capabilities, means a device having switching and forwarding capabilities. Mahlab, ¶ 16.

A router is a packet switching device which examines the IP protocol header as part of the switching process. Exh. 3, "Requirements for IP Version 4 Routers," F. Baker, Ed., Cisco Systems, Network Working Group, June 1995, at 5. See also, Exh. 4, Cringely, "Valley of the Nerds: Who Really Invented the Multiprotocol Router, and Why Should We Care?", http://www.pbs.org/cringely/pulpit/1998/pulpit_19981210_000593.html (December 10, 1998) ("The concept of a router (in those days called a gateway) as a packet switching device that operated at the network layer, arose from the same ferment as TCP/IP."). Merriam-Webster defines a router as "a device that mediates the transmission and transmission routes of data packets over an electronic communications network (as the Internet)." Exh. 5, *Webster's Third New International Dictionary, Unabridged.* Merriam-Webster, 2002. http://unabridged.merriam-webster.com (26 Apr. 2010).

In contrast, points 4, 5, 6, 7, 14, and 15 and the light source and modulator in Barnsley, are not routers and do not having routing capabilities. Furthermore, as known in the

art, such devices do not possess switching and forwarding capabilities. Mahlab, ¶ 17. Point 4 is an optical data generator and point 5 is a header generator. Mahlab, ¶ 18. Barnsley states:

> The optical data generator 4 produces data packets . . . by modulating a laser. . . . The header generator 5 produces header (control) signals . . . by modulating a second laser . . .

Mahlab, ¶19. There is no disclosure that generators 4 and 5 have routing, *i.e.,* switching and forwarding, capabilities. *Id.*

Point 6 is a WDM coupler. Newton's Telecom Dictionary, 20th edition (2004) defines "coupler" as "an optical device that combines or splits power from optical fibers." One of ordinary skill in the art would understand that couplers are not routers and do not have routing, *i.e.,* switching and forwarding, capabilities. See, Mahlab, ¶ 21.

Point 7 is a splitter, 14 is a band-pass filter, and 15 is an optical amplifier. Barnsley states that "splitter 7 demultiplexes a small proportion (typically a few percent) of the control signal 5a of an incoming packet and feeds this tapped signal to a band-pass filter 14 via a 1.3 μm optical amplifier 15." Col. 4, lines 18-21. One of ordinary skill in the art would thus understand that splitter 7, filter 14, and amplifier 15 are not routers, and do not have routing, *i.e.,* switching and forwarding, capabilities. See, Mahlab, ¶ 22.

The claims recite that the optical data signals were generated at a plurality of different network elements. The Office Action asserts that this limitation is met because the light source and modulator which are part of element 4 correspond to the claimed network elements because "each … are part of the network and are thereby considered network elements", citing column 2, lines 5-9. Final Rejection, page 3, lines 9-10. The Examiner further asserts that "the light source routes light towards the modulator and ultimately the fiber between elements 4 and

6, while the modulator within element 4 routes electrical data pulse input from an external data source to be modulated onto the light from the light source." This interpretation is unreasonably broad and does not comport with how one of ordinary skill in the art would understand the claim terms.

First, as noted above, the claims recite that each of the plurality of different network elements (or routers) has routing capabilities. One of ordinary skill in the art would understand that light sources and modulators do not have routing, *i.e.,* switching and forwarding, capabilities. Thus, they do not meet the claimed limitations. Mahlab, ¶ 23.

Second, the output of the light source is light – it is not data. The light is a carrier. The data is formed only by the modulator that modulates the light coming from the light source. Thus, the light source is not an element which generates data, and the light source and modulator cannot meet the limitation that the data signals are generated by a plurality of different network elements.

The node 1 described in Barnsley arguably has routing capabilities, as it includes optical switch 8, and thus has switching capabilities. However, Barnsley does not disclose two different communication paths between two nodes 1. Mahlab, ¶ 24. Nor does it disclose two communication paths between the head-end station and node 1.

Thus, Barnsley does not teach Appellant's claimed invention arranged as recited in claim 45. Mahlab, ¶ 31. Further, for the same reasons, Barnsley does not teach the claimed invention arranged as recited in claims 46, 66, 82, and 86.

The Examiner "maintains that the optical data signals and the optical addressing signals are carried along separate paths between elements 4, 5 and 6." Final Rejection, page 13,

paragraph 5. If, as Appellant contends, the only components that could reasonably be considered network elements are the head-end station and node 1, there is only a single path, *i.e.*, fibre 2, between those two network elements. And before being conveyed along that path, the optical data signals are superimposed on the optical addressing signals. In the responses filed before the Examiner, Appellant argued, and provided evidence that establishes that one of ordinary skill in the art would understand from the disclosure of Barnsley that the both data and control signals must arrive together to the next node, and that the operation of the whole Barnsley system relies on and is based upon the fact that both data and control signals arrive together. April 27, 2009, Response, pages 21-22.

In other words, for the Barnsley system to route a packet, the packet must contain the addressing signal. Therefore, if at all, Barnsley must be considered as teaching away from the present invention. Because unlike Barnsley, which needs to have both the addressing signals and the data arriving at the network element together in order to ensure that the network element has the control signal required to send the data to the next network element, the present invention is designed so that the control signals and the data travel at least part of their respective paths, separately. There is no explicit indication, nor any implicit suggestion provided by Barnsley, to transmit the data and control signals along different paths between two nodes or routers in the system, because Barnsley does not do so, and in fact, teaches away from doing so. *Id.*

According to Barnsley, the system disclosed includes "means for multiplexing the data and control signals onto the transmission line in such a manner that the duration of the control signal is at least equal to the duration of the data signal … to ensure that the control signal completely overlaps the data signal on arrival at the second node " (1:59-66) and also "As

the control signal overlaps the data signal, the two signals occupy the same time slot" (2:3-4). Mahlab, ¶ 32. The data generator and the header generator 5 are part of what Barnsley calls a head-end station. 3:55-57. "The header generator 5 produces header (control) signals… by modulating a second laser … so that the laser of the header generator 5 is turned on at, or just before, the start of the data packet… the header generator 5 is tunable so as to provide control signals at different wavelengths, each of which matches the receive wavelength of another network node" (3:60–4:5). Mahlab, ¶ 34. The modulation of the second laser (not shown) is chosen "so that the laser of the header generator 5 is turned on at, or just before, the start of a data packet 4a, off at, or just after, the end of that data packet." 3:65-4:1. In this way, the generation of the data and the header signals are synchronized so that they can be superimposed on the fibre 2 by the WDM coupler 6 (which thought it is not explicitly stated, is part of the head-end station).

Thus, one of ordinary skill in the art would understand from the disclosure of Barnsley that the both data and control signals must arrive together to the next node. Mahlab, ¶33. Moreover, one of ordinary skill in the art would understand that the operation of the whole Barnsley system relies and is based upon the fact that both data and control signals arrive together. Unless this was true, Barnsley's system would not work.

Because Barnsley does not disclose the claimed network elements and/or routers, Appellant respectfully submits that the rejection of claims 45-47, 53, 55, 66, 72, 82-83, and 86 should be reversed.

II. CLAIMS 48-52, 54, 67-71, AND 73 ARE NOT UNPATENTABLE UNDER 35 U.S.C. § 103 OVER BARNSLEY AND NIR (U.S. PATENT NO. 6,160,653).

As noted above, Appellant has established that the independent claims 45, 46, 66, 82, and 86 are not anticipated by Barnsley. With respect to the dependent claims rejected as being unpatentable over Barnsley in view of Nir, Appellant respectfully submits that Nir does not remedy the deficiencies established above with respect to Barnsley. There is nothing in Nir to suggest the use of network elements and/or routers as recited in the claims. Thus, claims 48-52, 54, 67-71, and 73 are believed to be patentable over the cited prior art, and the rejection should be reversed.

III. CONCLUSION

For at least these reasons, Appellant respectfully submits that the rejections in the Final rejection should be reversed.

Respectfully submitted,

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CLAIMS APPENDIX

1-44 (**Cancelled**)

45. (**Previously Presented**) In a telecommunication system, a method for routing optical data signals using a first communication path comprising at least one optical fiber extending between at least two network elements of the telecommunication system for carrying optical data signals separated from their associated optical addressing signals, and a second communication path comprising one or more optical fibers extending between at least two network elements of the telecommunication system for carrying optical addressing signals separated from their associated optical data signals, each of said at least two network elements having routing capabilities, the method comprising the steps of

providing a combination of said optical addressing signals to provide addressing information required for establishing an address for routing the optical data signals, and

providing at least one of said at least one optical fiber comprised in said first communication path for carrying said optical data signals separated from their associated optical addressing signals different from any of the one or more optical fibers comprised in said second communication path, and

wherein said optical data signals being conveyed separately from their associated optical addressing signals along said at least one optical fiber were generated at a plurality of different network elements, each of said plurality of different network elements having routing capabilities.

46. (**Previously Presented**) In a telecommunication system, a method for routing optical data signals between at least two routers in the system, said method comprising:

generating first optical addressing signals associated with the optical data signals by converting signals identifying a destination address into corresponding optical addressing signals;

transmitting said optical addressing signals separated from their associated optical data signals over one or more optical fibers comprised in a first communication path, said first communication path extending from one of the at least two routers to another router, each of said at least two routers having routing capabilities; and

concurrently or subsequently transmitting said optical data signals separated from their associated optical addressing signals to said another router via a second communication path comprising at least one optical fiber, said second communication path extending from said one router of the at least two routers to the another router, and comprising at least one optical fiber which is different from any of the at least one optical fibers comprised in said first communication path, wherein said optical data signals being conveyed separately from their associated optical addressing signals were generated at a plurality of different network elements, each of said at least two network elements having routing capabilities.

47. (Previously Presented) The method according to claim 46, further comprising the steps of:

generating new optical addressing signals associated with the next section of a transmission path extending from said one router of the at least two routers towards said destination address;

transmitting the new optical addressing signals over one or more optical fibers extending between said one router of the at least two routers and another router;

transmitting said optical data signals to said another router via an optical fiber extending between said one router of the at least two routers and said another router wherein said optical fiber over which said optical data signals are transmitted is different from said one or more optical fibers for carrying said optical data signals separated from their associated optical addressing signals; and

repeating the steps of generating new optical addressing signals, transmitting the new optical addressing signals separated from their associated optical data signals and transmitting said optical data signals separated from their associated new optical addressing signals to said another router, until said optical data signals are transmitted to said destination address via subsequent routers located along a transmission path extending towards said destination address.

48. (**Previously Presented**) The method according to claim 45, further comprising the step of transmitting, at one of two binary illumination states, the information extracted from at least one of the optical addressing signals.

49. (**Previously Presented**) The method according to claim 45, further comprising the steps of transmitting, at a certain illumination level, at least one of the optical addressing signals and presenting, by absence of illumination at least one other optical addressing signal.

50. (**Previously Presented**) The method according to claim 45, wherein at least two of the optical addressing signals are transmitted each at substantially the same wavelength and at different illumination intensity and wherein each of the illumination intensities corresponds to a different addressing information.

51. (**Previously Presented**) The method according to claim 45, wherein at least two of the optical addressing signals are transmitted each at substantially the same intensity and at a different wavelength, and wherein each of the different wavelengths corresponds to a different addressing information.

52. (**Previously Presented**) The method according to claim 50, wherein an optical address is derived from a combination of at least two optical addressing signals each transmitted at a different wavelength and at a different intensity from the other.

53. (**Previously Presented**) The method according to claim 46, wherein the transmission of at least one of the optical data signals is delayed until the following steps are performed:

decoding said optical addressing signals;

deriving addressing information from the decoded optical addressing signals; and

if required, generating another, or using said, optical routing address for further routing of said optical data signals.

54. (**Previously Presented**) The method according to claim 53, wherein the transmission of said at least one of the optical data signals is delayed by allowing said at least one of the optical data signals to pass through an optic fiber of a length corresponding to a desired delay in the transmission.

55. (**Previously Presented**) The method according to claim 46, further comprising:

transmitting to said one of the at least two routers an indication that said optical data signals can be forwarded towards their destination;

receiving said indication at said one of the at least two routers; and

transmitting, responsive to receiving said indication, said optical data signals towards said another router along said data transmission path.

56. (**Cancelled**)

57. (**Cancelled**)

58. (**Cancelled**)

59. (**Cancelled**)

60. - 65 (**cancelled**).

66. (**Previously Presented**) Routing apparatus for routing optical data signals, said apparatus comprises:

means for generating first optical addressing signals associated with said optical data signals by converting signals identifying a destination address into corresponding optical addressing signals;

means for transmitting said optical addressing signals from said routing apparatus to a second router over a first communication path comprising at least one optical fiber for carrying said optical addressing signals separated from their associated optical data signals, each of said routing apparatus and said second router having routing capabilities; and

means for transmitting said optical data signals from said routing apparatus to said second router along a second communication path comprising at least one optical fiber, said at least one optical fiber for carrying said optical data signals separated from their associated optical addressing signals and wherein said at least one optical fiber for carrying said optical data signals separated from their associated optical addressing signals is different from any of the at least one optical fibers comprised in said first communication path, and wherein said optical data signals being conveyed separately from their associated optical addressing signals, were generated at a plurality of different network elements, each of said plurality of different network elements having routing capabilities.

67. (**Previously Presented**) The apparatus according to claim 66, in which at least one of the optical addressing signals is transmitted at a certain illumination level and at least another optical addressing signal is presented by absence of illumination.

68. (**Previously presented**) The apparatus according to claim 66, in which at least two of the optical addressing signals are transmitted at substantially similar wavelengths and at a

different illumination intensity, and each of the illumination intensities corresponds to a different addressing information.

69. (**Previously presented**) The apparatus according to claim 66, wherein at least two of the optical addressing signals are transmitted at a different wavelength, and each of the different wavelengths corresponds to a different addressing information.

70. (**Previously presented**) The apparatus according to Claim 69, wherein said at least two of the optical addressing signals are transmitted at substantially similar intensity.

71. (**Previously presented**) The apparatus according to claim 66, in which at least two of the optical addressing signals are transmitted each at a wavelength and intensity that are different from the wavelength and intensity of the other one of said at least two of the optical addressing signals.

72. (**Previously Presented**) The apparatus according to claim 66, further comprising:

means for delaying said optical data signals;

means for decoding said optical addressing signals;

means for deriving addressing information from the decoded optical addressing signals; and

means for generating optical routing address signals for further routing of said optical data signals.

73. (**Previously Presented**) The apparatus according to claim 72, comprising an optic fiber for delaying the transmission of at least one of the optical data signals and means for directing said at least one of the optical data signals to pass through said optic fiber.

74 - 81 (**cancelled**).

82. (**Previously Presented**) Apparatus for transmitting optical data signals between at least two network elements in a system, comprising:

a) signal generating means for generating optical addressing signals associated with said optical data signals by converting signals identifying a destination address into corresponding optical addressing signals;

b) transmission means for transmitting said optical addressing signals separated from their associated optical data signals over a first communication path comprising one or more optical fibers and extending between the at least two network elements towards said destination address, each of said at least two network elements having routing capabilities; and

c) transmission means for transmitting said optical data signals towards said destination address along a second communication path comprising at least one optical fiber extending between the at least two network elements for conveying said optical data signals separated from their associated optical addressing signals, wherein at least one of said at least one optical fiber in said second communication path is different than any of the at least one optical fibers comprised in the second communication path, and wherein said optical data signals being conveyed separately from their associated optical addressing signals, were generated at a

plurality of different network elements, each of said plurality of different network elements having routing capabilities.

83. (**Previously Presented**) The apparatus according to Claim 82, further comprising means for receiving an indication that said optical data signals can be forwarded towards their destination, wherein said means for transmitting said optical data signals is adapted to transmit the optical data signals towards said destination responsive to receiving said indication.

84. (**Cancelled**)

85. (**cancelled**).

86. (**Previously Presented**) A telecommunication routing apparatus comprising:

a) receiving means for receiving first optical addressing signals;

b) signal generation means for generating second optical addressing signals associated with the next section of a transmission path extending towards a destination address;

c) transmission means for transmitting the second optical addressing signals separated from associated optical data signals over one or more optical fibers extending from said telecommunication routing apparatus towards the destination address representing a second network element, said telecommunication routing apparatus and said second network element each having routing capabilities;

d) receiving means for receiving optical data signals generated at a plurality of different network elements, each of said plurality of different network elements having routing capabilities; and

e) transmission means for transmitting the optical data signals received towards the destination address along an optical path extending from the telecommunication routing apparatus toward the second network element which comprises at least one optical fiber that is different from any one of said one or more optical fibers over which the second optical addressing signals separated from their associated optical data signals are transmitted.

EVIDENCE APPENDIX

Exh. 1: Declaration of Uri Mahlab dated April 20, 2009 and filed April 27, 2009.

Exh. 2: Newton's Telecom Dictionary, 20th ed., (2004), attached to Mahlab Declaration.

Exh. 3: "Requirements for IP Version 4 Routers," F. Baker, Ed., Cisco Systems, Network Working Group, June 1995, at 5.

Exh. 4: Cringely, "Valley of the Nerds: Who Really Invented the Multiprotocol Router, and Why Should We Care?", http://www.pbs.org/cringely/pulpit/1998/pulpit_19981210_000593.html

Exh. 5: *Webster's Third New International Dictionary, Unabridged.* Merriam-Webster, 2002. http://unabridged.merriam-webster.com (26 Apr. 2010).

U.S. Patent No. 5,448,501

U.S. Patent No. 6,160,652

RELATED PROCEEDINGS APPENDIX

None.